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Multi-Sensor Data From A-Train Instruments Brought Together for Atmospheric Research

The A-Train is comprised of a series of instruments, developed independently, that measure highly related atmospheric components along the same flight path. In order to intercompare data from this multitude of sensors, researchers must access, subset, visualize, analyze and correlate distributed atmosphere measurements from the various A-Train instruments. The A-Train Data Depot (ATDD) has been operational for over a year, successfully performing the aforementioned functions on behalf of researchers, thus providing co-registered data from the Cloudsat, CALIOP, AIRS, and MODIS instruments for further intercomparisons. Of late, significant data from OMI and POLDER are now included in the 'depot'. By specifying the desired spatial and temporal range, the researcher can subset, visualize, co-register, and access multi-sensor A-Train data related to: Cloud, aerosol, atmospheric temperature, and water vapor parameters (vertical profile visualizations); Cloud Pressure, cloud top temperature, water vapor, cloud optical thickness, and aerosol products (horizontal strips subsetted +/- 100km from the profile visualizations), and; Cloud pressure parameters (2-D line plots overlayed on the vertical profiles). All data is plotted using the GIOVANNI data exploration tool. A new feature of GIOVANNI is its ability to have collocated and subsetted data sets as well as PNG image files downloaded to the researcher's computing facility. By providing a convenient way to visualize and acquire multi-sensor data, ATDD affords users more time and effort to further their research.

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Multi-Sensor Data From A-Train Instruments Brought Together for Atmospheric Research

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Based on the NASA funded ACCESS Project: A-Train Data Depot: Integrating Atmospheric Measurements Along the A-Train Tracks Utilizing Data from the Aqua, CloudSat and CALIPSO Missions

Abstract

The A-Train is comprised of a series of instruments developed independently that measure highly related meteorological components along the same flight path. In order to inter-combine data from this multitude of sensors, researchers must access, subset, visualize, analyze and correlate distributed atmospheric measurements from the various A-Train instruments.

Sensors: CloudSat, CALIOP, AIRS, OMI, MLS, and MODIS

Areas of Study: Cloud, aerosol, atmospheric temperature, and water vapor parameters, atmospheric composition

Services: Dynamically subset, visualize, co-register, and access multi-sensor A-Train data

Saves researchers great amounts of time by using ATDD services.

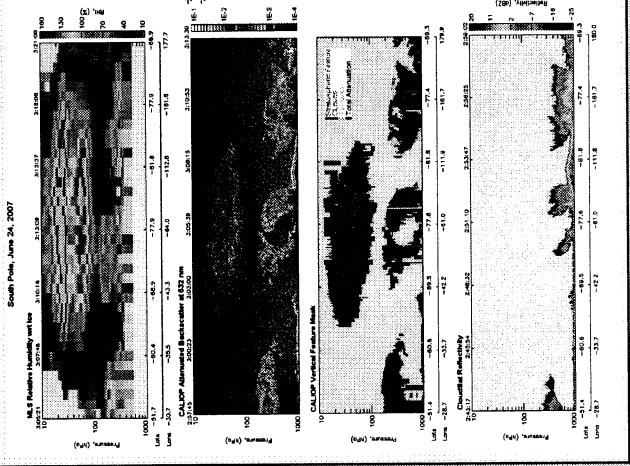
Output: HDF, PNG, KMZ (prototype)

What can the A-Train Data Depot Do For You

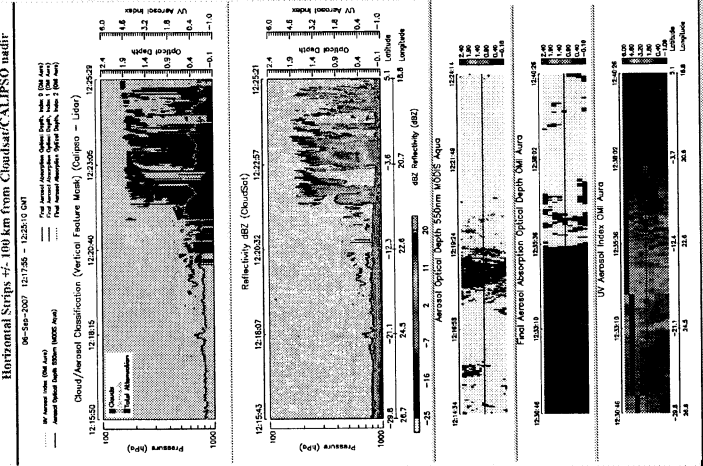
- Provide access to A-Train datasets from one portal (<http://disc.gsfc.nasa.gov/atdd>)
- Provide user friendly data visualization and exploration for science data discovery
- Provide much of the work each individual researcher would be spending valuable resources
- Creates user specified subsets of just the information nearest the A-Train path. Thus, no need to download and subset large volumes of data
- Access remote heterogeneous datasets for convenient download
- Correlate datasets of different formats, resolutions, scales onto common grids.
- Dynamically perform functions on specific user requested data of interest.
- Provide a virtual data environment that processes, archives, provides access, visualizes, analyzes and correlates distributed atmospheric measurements from various A-Train instruments along A-Train tracks.

LATEST NEWS:

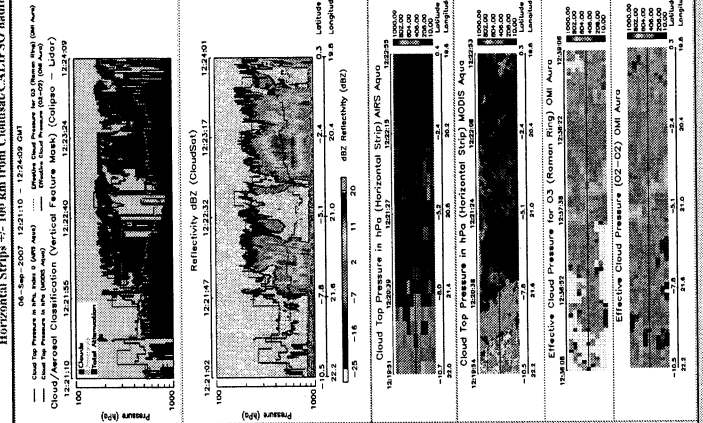
Aura to move closer to other A-Train platforms: Better Science MLS will coincide with CloudSat and CALIPSO, globally, not just at the poles. (See <http://disc.gsfc.nasa.gov/atdd> for full story and science benefits)



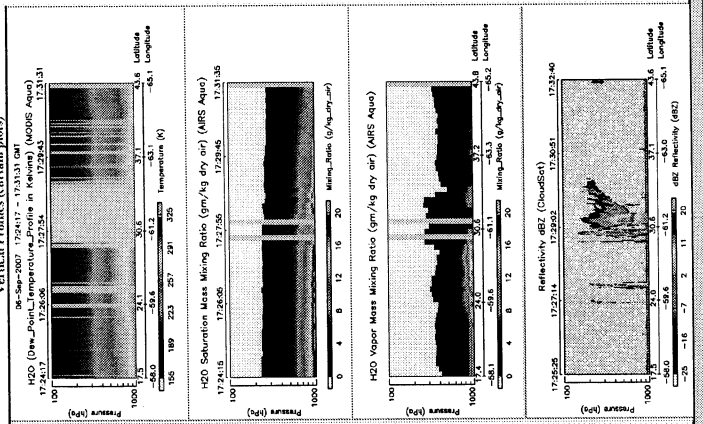
Studying Aerosols...



Studying Clouds...



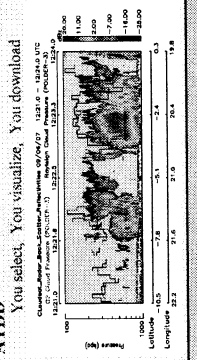
Studying Water Vapor Profiles...



Currently Accessible Products

- Vertical Profiles (Curtain Plots)**
 - CALIPSO - Cloud/Aerosol Classification
 - CloudSat - Received Echo Powers
 - CloudSat - Reflectivity dBZ
 - CloudSat - RO Ice Water Content (new)
 - CloudSat - RO Liquid Water Content (new)
 - CloudSat - RO Liquid Water Path (new)
- Temperature Profiles**
 - MODIS - Atmospheric Temperature Profile
 - AIRS - Atmospheric Temperature Profile
- Water Vapor Products**
 - MODIS - H2O (Dew Point) Temperature Profile
 - AIRS - H2O Saturation Mass Mixing Ratio
 - AIRS - H2O Vapor Mass Mixing Ratio
- Horizontal Strips +/- 100 km from CloudSat path or line that overflies upon vertical profile**
 - OMI - Effective Cloud Pressure for O3 (RR)
 - OMI - Effective Cloud Pressure (O2-O2)
 - OMI - Final Aerosol Absorption Optical Depth (new)
 - MODIS - Aerosol Optical Depth (new)
 - MODIS - Aerosol Index (new)
 - MODIS - Aerosol Fine Mode Fraction 550nm
 - MODIS - Cloud Optical Thickness
 - MODIS - Cloud Top Pressure
 - AIRS - Cloud Top Temperature
 - AIRS - Cloud Top Pressure
 - AIRS - Total Cloud Liquid Water

PROTOTYPE: POLDER data in the ATDD



PROTOTYPE: Exploring A-Train Data in 3D

You select, You visualize, You download
MODIS Cloud Top Temperature line plot on CloudSat Reflectivity profile. CloudSat Reflectivity profile on MODIS Daily Cloud Top Temperature Horizontal Surface.

The A-Train Instrument Principal Investigators

- Aqua - AIRS/AMU/HISB: Dr. Roy Spencer, UAH, Dr. Akira Shibata, JAXA
- Aqua - AMSR-E: Dr. Wilek, NASA LaRC
- Aqua - CERES: Dr. Vincent Salomonson, U. of Utah, NASA GSFC (emeritus)
- Aqua - MODIS: Dr. John Gille, UC, NCAR, Dr. John Barrett, Oxford
- Aura - HIRDLIS: Dr. Nathaniel Livesey, KMI, Dr. Johanna Tamminen, FMI, Dr. P.K. Bharti, NASA GSFC
- Aura - MLS: Dr. Reinhard Beer, KMI, Dr. Johann Tammann, FMI, Dr. P.K. Bharti, NASA GSFC
- Aura - OMI: Dr. David Winker, NASA LaRC
- Aura - TES: Dr. Graeme Stephens, CSU
- CALIPSO: Dr. Michael Mishchenko, Project Scientist, NASA JPL
- Cloud: Dr. David Crisp, NASA JPL
- OCO: Dr. Dieter Taus, LOA
- Parsol: Dr. Dieter Taus, LOA

2007 Metrics (plus 8)

- Number of Products Provided: 491,916
- Number of Product Types Available: 38
- Volume of Data Distributed: 8079 GB
- Volume of Data Available: ~16 TB

Coming ...

- Folder data operational
- AMSR-E, TES, HIRDLIS data
- NO2, CO2, other products
- User Selected Ranges
- MLS data along the CloudSat track
- UV aerosol index background on the orbit picker